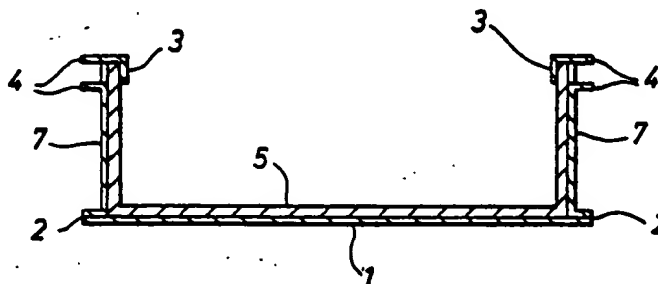




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(54) Title: CRATE



(57) Abstract

A crate, particularly intended for transporting and warehousing fresh fruit and vegetables, comprises a frame made of plastics material and formed of a base (1) and side walls (6, 7) preferably hinged to the base by means of integral hinges (2) made of thin sections of plastics material, the side walls being lockable together when the frame is erected, and the crate further comprising a lining (5) suitably of foamed plastics functioning in use to keep the contents of the erected frame within the latter.

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CRATE

The present invention relates to a crate, more particularly a folding, stackable crate particularly intended for the transport of fruit, vegetables and other food products.

- 05 Crates for the transport of fresh fruit and vegetables are normally made of either corrugated cardboard or of wood. Nearly all crates presently used for the transport of fresh fruit and vegetables from the growing areas to the wholesale and retail market use either
- 10 corrugated carton boxes or wooden boxes. In addition, there are a few plastics crates, some of which are designed to be disposable and others which are returned empty to the point of origin after use and for reuse again.
- 15 The wooden cases, which are disposable, tend to be expensive, are not hygienic and are difficult to print for the purposes of promoting the brand name of the producer. The wooden cases are, nevertheless, strong but are not necessarily stable when stacked since they
- 20 have no method of interlocking.

Corrugated cardboard cartons tend to be cheaper than wooden cases and are more hygienic. More important is the fact that they can be printed and can be used to make attractive displays of the product they carry.

05 They do not have the same stacking strength as wooden crates but their biggest problem is that they are not waterproof and lose most of their strength when wet or humid. As a result, the contents they carry are frequently damaged by the crates collapsing. This

10 fault is particularly significant since the cardboard cartons are frequently exposed to rain when they are in the field during harvesting.

Returnable plastics crates are expensive and require organization to ensure that they are not stolen or lost

15 and are returned to their owners for use again. The return cost of transport of empty crates is nearly the same as that for full crates and, therefore, the transport cost is virtually doubled when using returnable plastics crates.

20 Existing disposable plastics crates are hygienic, can be printed, stack moderately well and are not subject to damage by moisture or humidity. All existing disposable crates, however, are expensive (relative to wooden crates and cardboard carton crates) due to their

25 design, weight and their method of manufacture.

The present invention aims to provide a crate which largely overcomes the disadvantages of the existing types of crate, as described above.

05 The present invention provides a crate, particularly intended for transporting and warehousing fresh fruit and vegetables, which comprises a frame made of plastics material and comprising a base and side walls, the side walls being adapted to be locked together when the frame is erected, and a membrane or lining (hereinafter
10 referred to as a lining) functioning in use to keep the contents of the erected frame within the latter.

The side walls of the frame are preferably hinged to the base thereof, for example by integral hinges of plastics material, but alternatively the side walls may be
15 detachably connectable to the base, for example by clips which permit the side walls to be folded relative to the base when the side walls and the base are connected together.

Thus the frame of the crate of the invention may be
20 folded between a first position wherein the base and the side walls thereof lie generally in the same plane and a second, erected, position wherein the side walls are disposed generally transversely, usually perpendicular,

to the plane of the base, in which erected position the side walls are locked together, usually interlocked together, to form the erected frame which with the lining thus then constitutes a box for holding goods
05 such as fresh fruit and vegetables.

The foldable, stackable crate of the invention is particularly suitable for transporting and warehousing fresh fruit and vegetables at a competitive cost, while avoiding the problems of the prior art as mentioned
10 above.

Broadly the crate of the invention may essentially comprise a skeleton frame and a lining which is supported by the frame.

The frame itself may be a solid or open structure, or
15 some parts thereof may be solid while other parts are open. In particular the base of the frame may be constituted by a series of interconnecting ribs.

Alternatively the base of the frame may consist of a perimeter rib only, to which the frame side walls are
20 attached, and it is to be understood that such a frame having a base portion comprising a perimeter only may in certain intended uses of the crate be adequate for the

purposes of the invention.

The frame is made of plastics material such as polypropylene, while the lining is preferably made of a plastics material such as polystyrene or any other
05 plastics or other material, such as cardboard.

The purpose of making the frame as a skeleton is to keep the crate extremely light weight, and, therefore, of low cost while at the same time giving the crate a certain amount of rigidity for the purposes of stacking.

10 The purpose of the lining, on the other hand, is to act as a skin to keep the contents of the box formed by the erected frame inside the box and also in certain cases to act, in combination with a suitable lid of the crate, as a thermal insulation to keep the contents of the box
15 at a low temperature during hot weather.

The frame consists of a base and four side walls preferably connected to the base in one piece. This is most preferably achieved through an integral hinge which is a fine section of plastics material which can be bent
20 when the side walls are folded up.

When the side walls are folded up they may be suitably

connect d to each other at the corners by use of a clip mechanism, preferably by clips provided at the side edges of one pair of opposite side walls engaging corresponding recesses in the side edges of the other pair of opposite side walls.

05

The lining may be suitably a flat sheet of foamed or thermoformed plastics which is scored or hinged along two lines so that the centre part is approximately the same dimension as the base and the two areas either side are approximately equivalent to the sizes of the long sides of the crate, where the crate base is rectangular. The lining may be suitably a continuous sheet, or alternatively formed with a series of openings therein. The lining may also be provided with ridges and undulations to give it considerable extra strength, for certain uses of the crate

10

15

When assembling the crate, the lining may be suitably fitted under a clip or clips at the top of the inside of the long sides of the crate. As the long side walls are folded up the lining is wedged between the clips and the inside corners of the crate. Alternatively or additionally, the upper ends of the side wall portions of th lining may be retained by folded back or hinged portions of the upper ends of the frame side walls.

20

The lining, which for example can be as thick as 6-7 mm., is extremely strong in a vertical plane in terms of compression and can support heavy loads above it, especially in conjunction with the moulded frame.

05 Since the lining is also locked into the corners of the crate by the wedging action the part of the lining that covers the base is held taut so that heavy vegetables and fruit will not make the base bow or bend downwards.

As mentioned, the lining is preferably a foam material
10 which acts as an insulation barrier to keep for example vegetables cool inside. Because it is foamed it is also extremely light-weight (but nevertheless extremely strong) and therefore it is also of extremely low cost.

It is also envisaged that the lining may continue up
15 past the clips and fold over the top to make a lid for further insulation and to keep the produce covered for security and hygienic purposes. That part of the lining which may be folded over to form a lid may be suitably perforated or scored at the part to be folded over, so
20 that the folded over part may be readily torn off.

For example the lining may be provided with two further

portions attached to the two side areas thereof, the two further portions each having a dimension approximately equal to half the centre part of the lining, the two further portions being foldable to form a lid of the
05 crate. Alternatively there could be provided one such further portion only, having a dimension equal to that of the lining centre portion, attached to one side area of the lining and foldable over to form a lid of the crate.

10 As a further alternative, the crate may if desired be provided with a separate lid.

According to a further alternative embodiment of the invention, the lining may comprise a box having a base and four sides, generally corresponding to the
15 dimensions of the base and side walls of the frame. Such a lining in the form of a box may be suitably of cardboard or of thermo formed plastics. Such a lining in the form of a box may also be provided with a lid of any of the types described above.

20 The lining can be printed on the outside and the frame may be designed in such a way that large windows on the long sides allow the printing on the sides of the lining to be visible. Preferably at least one side wall of

the frame is provided with such a window opening.

Small spikes may be moulded on the top of the base of the frame. These spikes penetrate the foamed plastics and stop the foamed plastics lining from moving in a lateral direction.

In producing the crate according to the invention the frame will be most preferably produced by injection moulding and the lining may be applied in an indexed manner as the frame is formed. In this case the base portion of the lining may be pre-punched with one or more holes through which molten plastics is injected during the moulding cycle, thereby securing the lining to the frame as the latter is formed.

The invention will be further described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a schematic plan view of the frame of a crate according to the invention, in the flat or transportable position thereof;

Figure 2 is a section taken along the line A-A in Figure 1;

10

Figure 3 is a section taken along the same line A-A but with the side walls of the frame in the erected position thereof;

05 Figure 4 is a view similar to Figure 3 but with the lining positioned within the erected frame;

Figure 5 is a section taken along the line B-B in Figure 1;

10 Figure 6 is a section taken along the same line B-B but with the side walls of the frame in the erected position thereof;

Figure 7 is a view similar to Figure 6 but with the lining positioned within the erected frame, as in Figure 4;

15 Figure 8 is a plan view of a preferred embodiment of the frame of a crate according to the invention, in the flat or transportable position thereof;

Figure 9 is a section taken along the line C-C in Figure 8;

20 Figure 10 is a section taken along the line D-D in Figure 8;

Figure 11 is a schematic plan view of another embodiment of the frame of a crate according to the invention, in the flat or transportable position thereof; and

05 Figures 12a - 12d are schematic plan views of various embodiments of linings of crates according to the invention.

The crate shown in the drawings comprises a frame formed a base 1 and four side walls, two of which are short-side walls 6 and two of which are long-side walls 10 7 which are preferably window walls, i.e. large openings or windows are formed therein. The base 1 and the side walls 6,7 are made of a plastics material such as polypropylene.

15 The base 1 is connected to the side walls 6,7 by integral hinges 2 which are constituted by fine, i.e. relatively thin, sections of plastics material which can be readily bent when the side walls are folded up to erect the frame.

20 As shown in Figures 1,2 and 5, the frame may lie generally flat wherein the base and the side walls are disposed in the same plane. In this position several

such crates may be stacked together for easy transport thereof.

When it is desired to erect the frame into the position shown in Figures 3 and 6, the side walls 6,7 are simply
05 folded about the hinges 2 into positions in which they are perpendicular to the plane of the base 1, the side walls being locked together along their vertical adjacent edges by clips (not shown in detail in the drawings of this embodiment) or other suitable fastening
10 means.

Along their edges remote from the hinges 2, the side walls 6,7 are provided with lateral ribs 4 for strength, as shown. The ribs also serve to assist in stacking erected crates one upon the other. Further, the upper
15 and lower corners of the erected crate may be shaped to assist stacking.

There are also provided along the side walls 7 clips 3, as shown, for retaining a lining 5 which forms the other component part of the crate.

20 The lining 5 is made of a foamed plastics material, such as polystyrene.

The lining 5 is shown in Figures 4 and 7 and comprises a flat sheet of foamed plastics which is scored or hinged along two lines so that the centre part is approximately the same dimension as the base 1 and the two areas

05 either side are approximately equivalent to the sides of the long side walls 7 of the crate. The folding of the side wall portions of the lining is preferably achieved through integral hinges which are constituted by relatively thin sections of material.

10 When assembling the crate, the plastics lining 5 is fitted under the clips 3 at the top of the inside of the long side walls 7 of the frame. As the long side walls are folded up the lining 5 is wedged between the clips 3 and the inside corners of the frame.

15 As previously indicated, the crate described above is particularly suitable for transporting and warehousing fresh fruit and vegetables. The frame gives the crate a certain amount of rigidity, while the lining acts as a skin to hold the contents of the erected frame and also
20 to act as a thermal insulation to keep the contents of the crate at a suitable temperature.

The lining, when made of foamed plastics material, can support heavy loads, especially in conjunction with th

rigid frame. Since the lining is effectively locked into the crate by a wedging action, the part of the lining that covers the base is held taut so that heavy vegetables and fruits will not make the base bow or bend downwards.

05

Figures 8 to 10 shows another, preferred, embodiment of a frame formed of a base 11 comprising a series of ribs 11a, 11b and four sidewalls, two of which are short-side walls 16 and two of which are long-side walls 17 which are preferably window walls, i.e., large openings or windows are formed therein. As before, the base 11 and the side walls 16,17 are made of a plastics material such as polypropylene.

10

While as shown the base 11 comprises a network of ribs 11a connected to a perimeter rib 11b, as mentioned previously in certain circumstances it may be sufficient if the base 11 consists of the perimeter rib 11b only.

15

The base 11 is connected to the side walls 16,17 by integral hinges 12 which are constituted by fine, i.e., relatively thin, sections of plastics material which can be readily bent when the side walls are folded up to erect the frame.

20

15

As shown in Figures 8, 9 and 10, the frame may lie generally flat wherein the base and the side walls are disposed in the same plane. In this position several such crates may be stacked together for easy transport thereof.

When it is desired to erect the frame into a position similar to that shown in Figures 4 and 7, the side walls 16, 17 are simply folded about the hinges 12 into positions in which they are perpendicular to the plane of the base 11, the side walls being locked together along their vertical adjacent edges by clips 24 provided on the side walls 16 engaging in corresponding recesses 25 in the side walls 17, or by other suitable fastening means.

Along their edges remote from hinges 12, the side walls 16, 17 are provided with lateral ribs 14 for strength, as shown. The ribs 14 may in particular prevent the frame from bowing outwards when several crates are stacked one upon the other. There are also provided along the side walls 17 clips 13, as shown, for retaining a lining 5 which forms the other component part of the crate. The lining 5 is suitably as shown in Figures 4 and 7.

When assembling the crate, the lining 5 is fitted under

the clips 13 at the top of the inside of the long side walls 17 of the frame. As the long side walls are folded up the lining 5 is wedged between the clips 13 and the inside corners of the frame.

- 05 The upper ends of the lining side wall portions are also retained by hinged portions 22 provided at the upper ends of the frame side walls 17 and extending back slightly into the crate in the erected position of the frame. The hinged portions 22 have detent portions 22a
10 for firmly engaging corresponding recesses 22b (see Figure 8) formed in the frame side walls 16. The engagement of the hinged portions 22 of the side walls 17 with the side walls 16 gives the erected frame a more rigid structure, and may prevent the frame from bowing
15 outwards under a stable vertical load, and also may prevent longitudinal torsion of the frame.

Thus, when assembling the crate, the lining 5 is located in the erected frame and normally retained therein by means of the clips 13 and hinged portions 22.

- 20 The side walls 16 of the frame are provided as shown in Figure 8 with a series of corrugations 23.

The long side walls 17 of the frame are provided with

tapered or funelling ribs 28 for assisting the location of the lining within the erected crate.

The frame of the crate gives the crate a certain amount of rigidity, while the lining acts as a skin to hold the contents of the erected frame and also to act, in combination with a suitable lid of the crate, as a thermal insulation to keep the contents of the crate at a suitable temperature. The lid of the crate may be formed as an extension of the lining as previously mentioned, or the crate may be provided with a separate lid.

The crate is made lighter in weight by virtue of the skeleton structure of the frame, which is nevertheless cheap to produce, and yet is sufficiently to support a load retained in the crate by the lining and by the side walls 16 of the frame.

The inherent strength (tensile strength) of the whole crate structure is essentially improved by the positioning of the lining within the erected frame.

While in the embodiments of Figures 1 to 7 and 8 to 10 the frame side walls are integrally hinged to the frame base, it is envisaged that the side walls may be

detachably connectable to the base, for example by means of clips, similar to the clips 24 co-operating with the recesses 25 as shown in Figure 8, such clips preferably permitting the side walls to be folded or hinged relative to the base when the side walls and base are connected together.

Figure 11 shows another embodiment of a frame similar to that shown in Figures 8 to 10, except that the short side walls 26 have formed therein a series of openings or small windows 26a.

Figures 12a - 12d show, in plan view, various embodiments of linings 15 in the flat or non-folded positions thereof.

The lining 15 shown in Figure 12a comprises a base portion 15a of substantially the same dimensions as the base portion of a crate in which it is in use positioned, and two side wall portions 15b which will in use lie adjacent the long side walls of the crate in the erected position of the latter. The side wall portions 15b may be folded relative to the base portion 15a about score lines or hinge portions 19, preferably constituted by relatively thin sections of the material of the lining 15.

The lining shown in Figure 12b is similar to that shown in Figure 12a except that the portions 15a and 15b of the lining are provided with a series of openings 18 therein.

05 The lining shown in Figure 12c is similar to that shown in Figure 12a, but further comprises a pair of top portions 15c which when the lining is positioned in an erected crate may be folded over to form a cover for the contents of the crate. The portions 15c may be folded
10 relative to the side wall portions 15b by score lines or hinge portions 20 similar to the score lines or hinge portions 19.

The lining shown in Figure 12d is similar to that shown in Figure 12c except that the portions 15a, 15b and 15c
15 of the lining are provided with a series of openings 18 therein, as in the embodiment of Figure 12b.

In the linings of Figures 12c and 12d, the portions 15c may be suitably scored or perforated at 20, so that the portions 15c may be readily torn off to gain ready
20 access to the contents of the crate.

In the embodiments shown in Figures 12c and 12d the top portions 15c each have a width equal to half the width

of the base portion 15a. Alternatively there could be one top portion 15c only, having a width equal to the width of the base portion.

CLAIMS:

1. A crate, characterized by comprising a frame made of plastics material and comprising a base (1; 11; 21) and side walls (6, 7; 16, 17; 26, 27), the side walls being adapted to be locked together when the frame is erected, and a lining (5; 15) functioning in use to keep the contents of the erected frame within the latter.
2. A crate as claimed in claim 1, characterized in that the side walls of the frame are hinged to the base thereof.
3. A crate as claimed in claim 2, characterized in that the base of the frame is connected to each side wall by an integral hinge (2; 12) of plastics material which can be bent when the side walls are folded up.
4. A crate as claimed in any of claims 1 or 3, characterized in that the lining is formed of a foamed plastics material.
5. A crate as claimed in any of claims 1 to 4, characterized in that the lining (15) is scored or hinged along two lines (19) so that the centre part (15a) is approximately the same dimension as the base of

the fram and th two ar as (15b) either sid are approximately equivalent to the sizes of two opposite side walls of the frame.

6. A crate as claimed in claim 5, characterized in
05 that the lining is provided with two further portions (15c) attached to the said two side areas (15b), the said two further portions (15c) each having a dimension approximately equal to half the said centre part (15a) of the lining, the said two further portions (15c)
10 being foldable to form a lid of the crate.

7. A crate as claimed in claim 5, characterized in that the lining is provided with a further portion (15c) attached to one of the said two side areas (15b), the said further portion (15c) having a dimension
15 approximately equal to the said centre part (15a) of the lining, the said further portion (15c) being foldable to form a lid of the crate.

8. A crate as claimed in claim 6 or 7, characterized in that the or each said further portion (15c) of the
20 lining which is foldable over to form a lid is perforated or scored (20) adjacent the said respective side area (15b) of the lining.

9. A crat as claimed in any of claims 1 to 8,
characterized in that two opposite side walls (7; 17) of
the frame are provided at their edges remote from the
base with clips (3; 13) for retaining the edges of the
lining.

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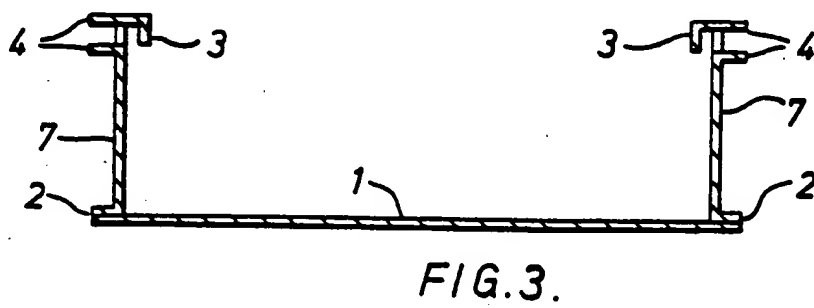
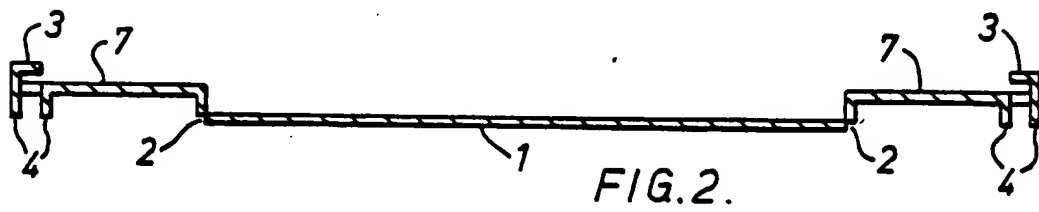
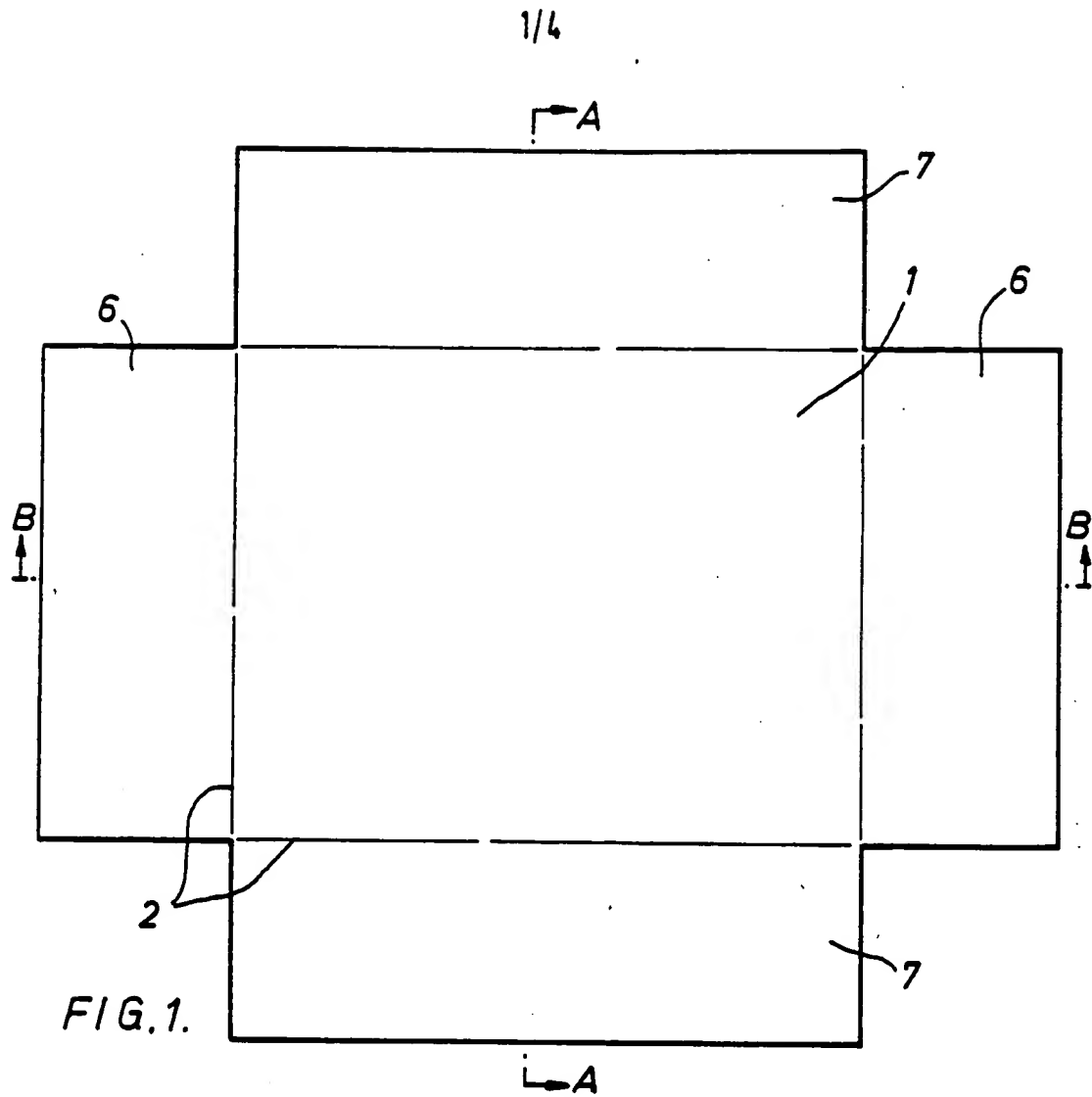
10. A crate as claimed in any of claims 1 to 9,
characterized in that two opposite side walls (17) of
the frame are provided at their edges remote from the
base with hinged portions (22) adapted to engage
corresponding portions (22b) of the other two opposite
side walls (16) of the frame in the erected position
thereof.

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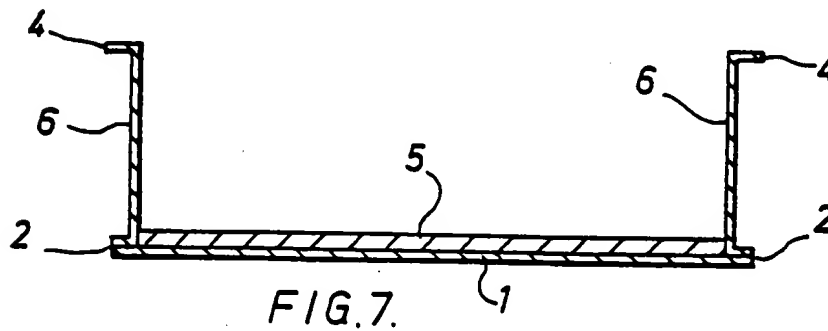
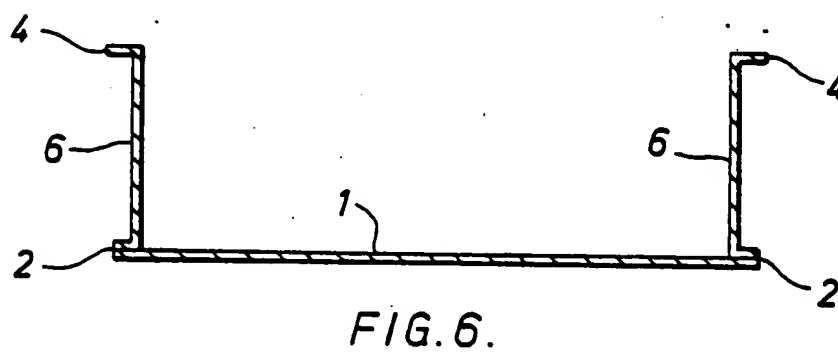
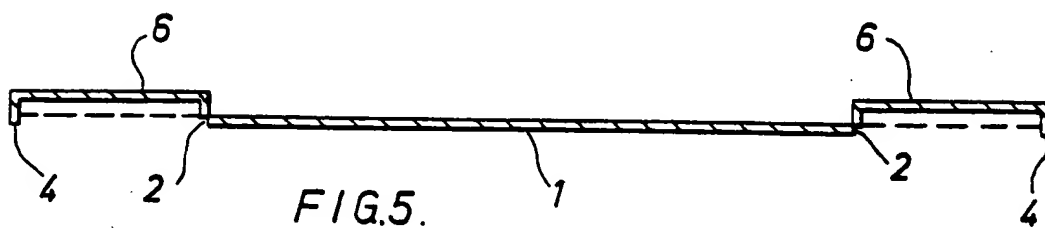
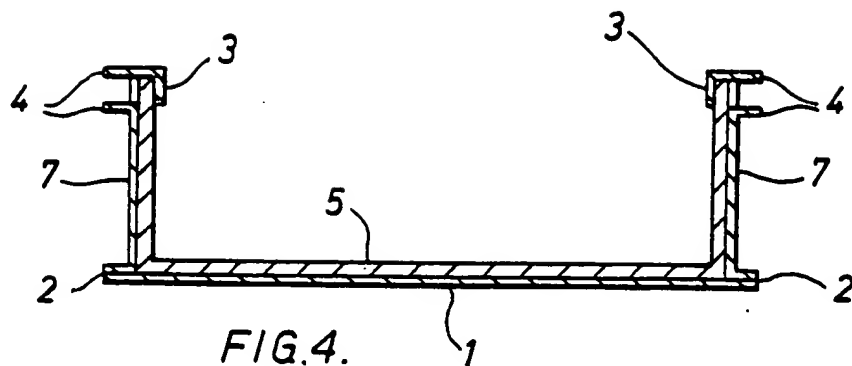
11. A crate as claimed in any of claims 1 to 10,
characterized in that at least one side wall (17) of the
frame is provided with a window opening.

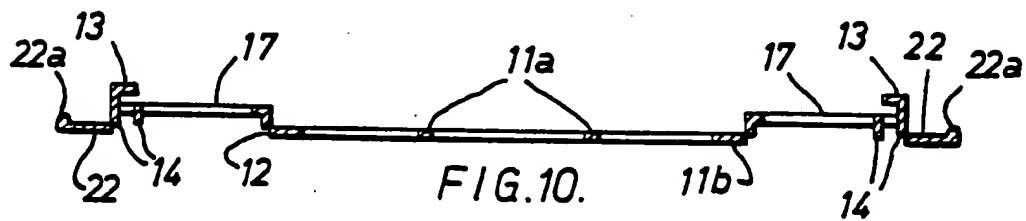
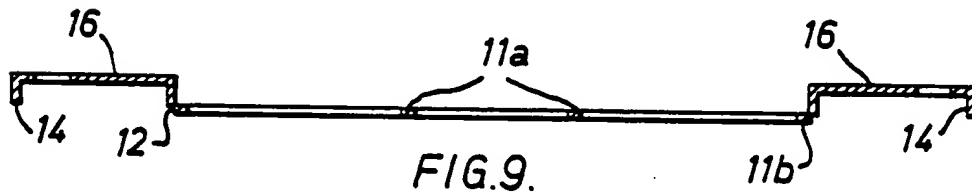
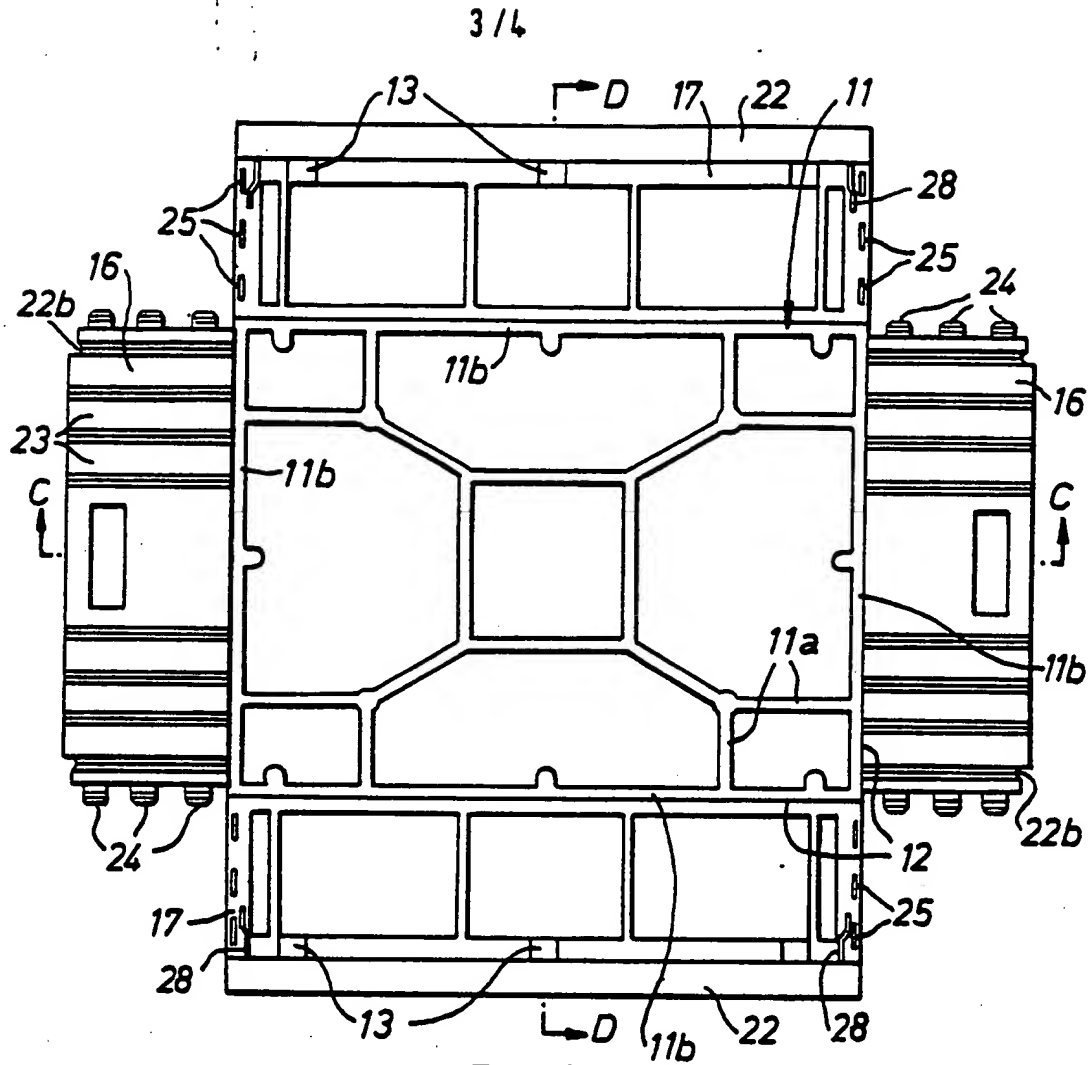
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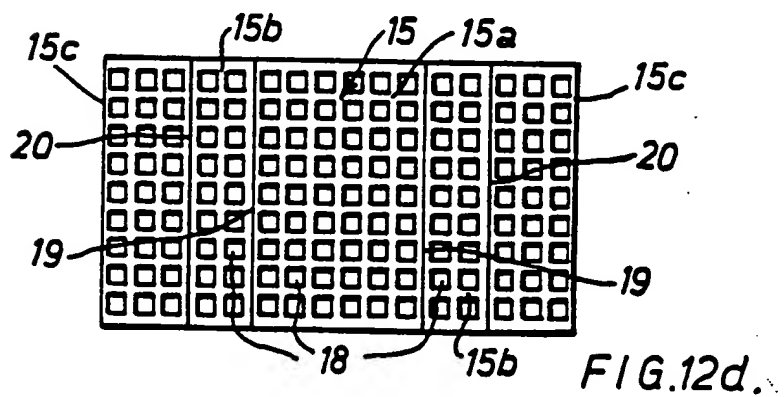
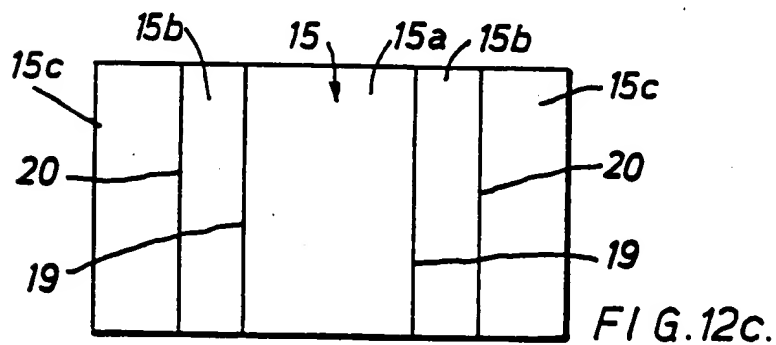
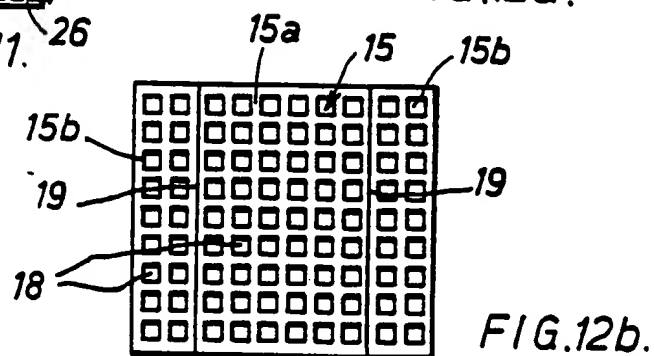
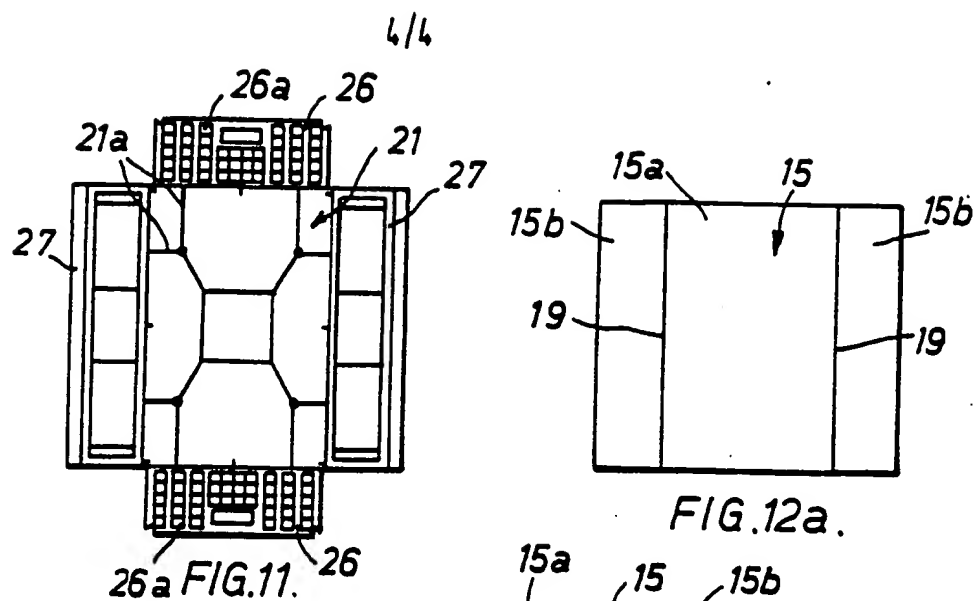
12. A crate as claimed in any of claims 1 to 11,
characterized in that small spikes are formed on the
base of the frame for penetrating and retaining the
lining.



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INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 85/00363

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) *

According to International Patent Classification (IPC) or to both National Classification and IPC
 IPC⁴: B 65 D 85/34; B 65 D 6/10; B 65 D 25/16

II. FIELDS SEARCHED

Minimum Documentation Searched ⁷	
Classification System	Classification Symbols
IPC ⁴	B 65 D

Documentation Searched other than Minimum Documentation
 to the Extent that such Documents are Included in the Fields Searched *

III. DOCUMENTS CONSIDERED TO BE RELEVANT *

Category *	Citation of Document, ¹¹ with Indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
Y	DE, A, 2854575 (FISCHER) 26 June 1980, see page 8, lines 12-20; figures 1-4 --	1,2,3,5,10
Y	FR, A, 1450216 (I.S.A.P.) 19 August 1966, see abstract, part 1; figures 11,12 --	1,2,3,5,10
A	US, A, 1574314 (STONE) 23 February 1926, see page 1, lines 48-52; page 2, lines 85-93; figures 1-5 --	4,9
A	US, A, 4211358 (CRANE) 8 July 1980, see column 3, lines 21-38; figure 1 --	6
A	US, A, 3734334 (McCREA) 22 May 1973, see column 3, lines 22-31; figures 1-3 -----	7,8,11

* Special categories of cited documents: ¹⁰

- "A" document defining the general state of the art which is not considered to be of particular relevance
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- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

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IV. CERTIFICATION

Date of the Actual Completion of the International Search
 5th November 1985

Date of Mailing of this International Search Report

22 NOV. 1985

International Searching Authority

EUROPEAN PATENT OFFICE

Signature of Authorized Officer

G.L.M. Ruydenberg

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON

INTERNATIONAL APPLICATION NO. PCT/GB 85/00363 (SA 10380)

This Annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 18/11/85

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-A- 2854575	26/06/80	None	
FR-A- 1450216		None	
US-A- 1574314		None	
US-A- 4211358	08/07/80	US-A- 4147289	03/04/79
US-A- 3734334	22/05/73	None	

For more details about this annex :
see Official Journal of the European Patent Office, No. 12/82